1.3 The Interaction between Sciences and Humanities in Nineteenth-Century Scientific Materialism

A Case Study on Jacob Moleschott’s Popularizing Work and Political Activity

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Positivism is normally understood as favoring separation of the humanities and the natural sciences, rather than interaction between them. This is because, around the 1850s, the modern scientific method seemed to provoke a progressive demarcation between the exact sciences and other disciplines. I would like to question this assumption by analyzing the attitude of Jacob Moleschott’s scientific materialism – which has typically been interpreted as one of the most radical movements within Positivism – vis-à-vis the humanities.

Moleschott was born in ’s-Hertogenbosch in 1822 and died in Rome in 1893. He had a very international, that is to say, European career: he studied medicine in Heidelberg and was Privatdozent at the University of Heidelberg, later taught at the University of Zürich and was finally appointed Professor of Physiology at the University of Turin in 1861. He became Senator of the newly established Italian Kingdom in 1876 and Professor at ‘La Sapienza’ in Rome in 1878.

Together with Carl Vogt (1817-1895) and Ludwig Büchner (1824-1899), Moleschott is considered to be one of the most representative materialist scientists in the nineteenth century. However, Moleschott’s engagement in cultural politics was unique among the materialists: in fact, he was the only one who sketched the position of the sciences and the humanities in the context of a national educational system in such an extensive manner. It is interesting to observe that, in the debates on public education at the Italian Senate in the 1880s, the most convinced supporters of the project of a ‘Philosophical Faculty’ embracing the sciences and the humanities were a physiologist (Moleschott) and a mathematician (Luigi Cremona [1830-1903]).

Moleschott’s conception of science aimed at including, rather than excluding, ethical, religious and broader cultural and philosophical issues. Via Moleschott, materialism can be interpreted as focusing neither on a rigid demarcation between the natural sciences and the other disciplines, nor on the definition of a strict criterion for ‘scientificity’ to which every discipline must conform, but
rather on the absorption of the humanities within the framework of materialist science.

The figure and the work of Jacob Moleschott are excellent models for examining the construction of the modern conceptions of both the sciences and the humanities in the second half of the nineteenth century. Even though his thought has been mostly interpreted as reductionist and strongly empiricist, not yet studied source material shows that, rather than strictly separating the domain of the natural sciences from any other domain, Moleschott’s materialism constituted an all-encompassing worldview that sought to expand the influence of materialism beyond the sheer divulgence of empirical research. Having been a member of the Senate and an important personality in both the public and cultural life of his times, Moleschott is an illuminating example of the ‘inclusiveness’ of scientific materialism: he contributed both in theory and in practice to the convergence of the sciences and humanities.

In order to examine the relation between the empirical sciences and the other disciplines (in particular, between the natural sciences and the humanities), let us turn to a number of speeches by Moleschott: the first is a speech delivered at the University of Turin in 1867 for the beginning of his sixth course on experimental physiology at that university, entitled ‘Della causalità nella biologia’. The others were held at the Senate between November 29, 1886, and February 5, 1887, on the occasion of a discussion about the national educational system, as well as one held on June 21, 1884, about the procedure for appointing new professors. These Senate speeches give a clear example of the intertwinement between epistemological and socio-political issues in materialism; moreover, they are unique in sketching and explaining precisely how the ‘unity of science’ – a key concept in Moleschott’s thought – would function in the concrete context of national institutions.

The interaction between arts and sciences: The idea of ‘humanity’ and the role of history

That history should not be opposed but should rather be strictly related to nature is one of the central concepts of the introductory lecture Moleschott gave for his course in experimental physiology at the University of Turin in 1867, called ‘On Causality in Biology’. Here the relation between materialist science and the humanities is explicitly declared to be one of nonexclusion, since it is clearly stated that ‘poetry does not exclude positivism, in the same way as the latter one is not opposed to the former’. As a whole, this speech approaches the theme of the interaction between various disciplines not just abstractly, but also in the form
of the concrete collaboration between natural scientists (‘naturalists’) and representa-
tives of what we would call ‘humanities’ (a term which is, however, never men-
tioned in this speech nor elsewhere in Moleschott’s work) and ‘arts’: ‘poets’
and ‘naturalists’ are said to have helped each other in the understanding of the
necessary laws governing knowledge, so that now scholars of ‘moral disciplines,
linguistics, history, [and] social sciences agree with scientists in the application of
that method, which is necessarily required by the natural, i.e., necessary, develop-
ment of every thing’.

Continuous exchange between ‘nature and history’, that is, in our contempo-
rary terminology, between the sciences and the humanities, or between nature
and culture, is presented as the fundamental element for that ‘sublime’ and ‘most
noble’ human aspiration which is the ‘unity of science’.

Moleschott observes that, if the diversity of the respective methods has
brought about the formation of two categories, namely that of ‘philosophers’ and
that of ‘scientists’, the methods now tend toward unification: ‘linguistics is for a
great part becoming a branch of physiology, following the footprints of natural
sciences,’ where physiologists and philologists ‘join their efforts to cultivate it’. At
the same time, ‘modern historical methods’ are said to be the very same methods
that ‘have been dominant for a long time in the natural sciences’, while ‘the univer-
sal laws of history necessarily emanate from nature’.

Even the essence of Darwin’s theory seems to be the introduction of a dynam-
ic, diachronic and therefore historical dimension in the study of nature, as Mole-
schott describes in both the commemoration of Charles Darwin held in Rome
in 1882 and the discourse he pronounced at La Sapienza in 1892. Moleschott
transfers Darwin’s conception of evolutionary theory beyond natural science and
toward history as a discipline, an idea that is rarely found among historians at
that time, but was becoming popular among natural scientists and sociologists.

One of the major features of Moleschott’s conception of science, above and
beyond his ideas about educational politics, was therefore to stress the role of his-
tory in the system of knowledge and, consequently, in the concrete organization
of the sciences. On the level of epistemology (intended as justification of a claim
to knowledge and foundation of a scientific discipline), Moleschott conceives
the great revolutions in physics and biology (Mayer’s and Darwin’s theories) as
founding natural science on the study of diachronic development instead of con-
centrating on its static forms (classification); at the same time, in all of his open-
ing lectures at the university Moleschott justifies and explains physiology and
biology as disciplinary fields by referring to their own history. On the level of the
structuring of the educational system, history occupies a special place: it is pre-
cisely the historical approach that, referring to empirical objects such as sources,
guarantees the ‘scientificity’ of a discipline. This is why Moleschott cares so much
about a transformation of theology into history of religion – a particularly im-
portant task in the Kingdom of Italy, which was constituted both territorially and
ideologically in opposition to the Catholic Church (represented by the Vatican
and by the Habsburg Monarchy).

‘Embracing nature and history’,12 which is described by Moleschott as the ideal
task of systematization that leads to the unity of science, also leads to a transfor-
mation of both the task and the conception of philosophy: ‘a philosopher cannot
consider his work as being juxtaposed to that of natural scientists’, since ‘any phi-
losophy worthy of its name embraces the quintessence of the tree of science’, and
is even its ‘ripest fruit’, to cite a recurrent image in Moleschott’s representation of
the systematization of science. ‘It is precisely philosophy, permeated by the unity
of the law of necessity, which is itself induced by both natural and historical facts,
that has to sublimate them in that universal organism which will be the adequate
and therefore beautiful expression of science. This kind of philosophy will demon-
strate the natural conditions of historical events, [and] the historical conditions
of natural phenomena, always through one and the same method, that is, the
experimental and inductive method.’13

The unifying task of philosophy would still be one of the essential elements of
Moleschott’s thought twenty-one years later, when, having become a member of
the Senate, he would propose a reform of higher education that would take into
account the role of philosophy as synthesizing science into an organic unity. That
this unity is considered to be beautiful because it is adequate is a clear reference
to Hegelianism. However, the ‘Philosophical Faculty’ as conceived by Moleschott
in his Senate speeches does not refer to that ‘experimental and inductive method’
which, according to the abovementioned university lecture, should be adopted
by philosophy; therefore, Moleschott’s view in the 1880s seems to be even more
flexible and tolerant vis-à-vis nonempirical sciences.14 The system of science as
a universal organism is significant if one considers the similarity to the organic
conception of nature: Moleschott tried to find a ‘natural’ system of the sciences,
as is also evident from the statement that it is ‘the law of necessity’ that informs
philosophy, giving it unity and beauty.

On the biographical level, we can find the idea of a synthesis of science and
what he calls ‘humanity’ as an ideal in Moleschott’s correspondence with the
Swiss geologist Edouard Desor. The theme appears quite often in his letters, in
particular with reference to the theologian Theodore Parker; Parker is said to
uniquely combine science and humanity, thereby unifying them15 – where it is
clear that ‘Humanität’ does not indicate general moral principles, but a precise
idea of humanistic culture. ‘Humanity’ as a value thus appears to be a central re-
quirement for scientific research: something that pertains to the natural scientist
no less than it pertains to other scholars.
In other letters, Moleschott refers to Parker’s work on the history of religion and to its importance for his own project of writing a book on anthropology, which he never finished. Substituting theology with the history of religion was one of the points of Moleschott’s program for a reform of higher education: history, considered ‘in its broadest sense’, had been presented in the Senate speeches held in 1886-1887 as an essential subject in the Philosophical Faculty. Such a ‘faculty’ was conceived as being propaedeutic to further studies, including the natural sciences and technical subjects, on the model of the German Philosophische Fakultät. It would also have among its tasks a serious examination and discussion of religious issues (again, ‘intended in the broadest sense and not as dogmatism’), which constituted an important mission for the government after the suppression of theological faculties, as Moleschott himself observed:

History, which should be taught in those Faculties in the broadest sense, will be required to examine religious issues minutely and conscientiously. According to me, as the Senate knows, this does not mean dogmatic issues, but religion as it is present in the human heart, which everyone wants, in one’s own way, to be seriously examined and discussed, according to one’s own beliefs or philosophical opinions.16

On the political level, this implies a secularization of education; on the epistemological level, it indicates a task that the natural sciences and humanities have in common, namely including the historical perspective while taking into consideration either their object of study (theology becomes history of religion) or the discipline itself (the history and prehistory of physiology and biology is constantly referred to in all of Moleschott’s opening lectures). The humanities are thus characterized by Moleschott as sciences having their object of study in the empirical world.

The ‘Philosophical Faculty’ and the ‘Unity of Science’

Moleschott’s Senate discourse on higher education dating from 1887 is structured around the form and function of that ‘ground’ which unifies all disciplines – or ‘the whole of knowledge’, as Moleschott says when he directly asks his colleagues at the Senate to judge for themselves about their own fields of knowledge. The latter expression clearly indicates a holistic view of knowledge (which we might compare with his organicist view of nature), while the word ‘ground’ assumes a very concrete meaning, once we think of it as a necessary presupposition for the growth of vegetation. In fact, Moleschott affirms that the juries for a competition
in higher education, as well as their respective disciplines, cannot be pigeonholed (literally; ‘closed in a box’), since the branches of knowledge are connected and interwoven with each other, and all disciplines, all branches have a common ‘trunk’:

Knowledge becomes fertile through all disciplines, it develops branches through them, it is interwoven with all of them; every discipline needs the other disciplines in order to refer to them, to develop, to be applied to and through them; in conclusion all disciplines, all branches of the knowable have a common trunk. 17

The image of the tree, another topos of science-systematization around 1850-1900,18 here stands for the unity in the complexity which characterizes the ‘unity of science’ and its concrete actualization, at least as Moleschott maintains it in this discourse on the ‘Philosophical Faculty’.

In accordance with the taxonomic aim of the speech, all single disciplines find their place in the scale of knowledge. Physiology is taken as an example in order to explain the all-encompassing nature of knowledge, so that a physiologist, according to Moleschott, must take into consideration also physics, chemistry, natural history, anatomy, as well as pathology (including clinical pathology) and, last but not least, philosophy. In order to indicate the synthesis of disciplines that characterizes materialist science and, in particular, physiology (Moleschott’s own special field), he states that a physiologist ‘would cease to be a physiologist from that day, in which he forgot that he must be an anthropologist’.19

This particular discourse, then, far from being merely political, is also of fundamental importance in order to comprehend why Moleschott decided to write a work entitled ‘Anthropologie’. Moleschott’s Anthropologie represents exactly this all-encompassing sphere described above, in which all disciplines are bound together and put into relation – gaining universality, but not losing their own specificity. This is evident not only from its structure, but also from its programmatic introduction, where the continuity between organic and inorganic substances is underlined.20 In this respect, continuity with Schelling’s idea of unity is noticeable:21 the materialists did not give up the ideal of unification and of the creation of a system of science; on the contrary, they conceived establishing relations between disciplines and domains as one of the core tasks of science. Furthermore, the interrelation between domains is no longer derived from abstract thought, but presented as a result of the most recent scientific research in the fields of biology, physiology and psychology. It is precisely this set of relations connecting all different disciplines (or, better, all different fields of knowledge) that guarantees the ‘unity of science’: unity as relation, then, as interconnected structure providing every scientist with a ‘general view’, a broad perspective on the whole field of
knowledge. This is the feature, according to Moleschott’s speech, of all the ‘masters from whom knowledge and power derive’; among these, he mentions Helmholtz, Golgi, Wilhelm Wundt, and his disciple Angelo Mosso. Significantly, the work of all of these scientists has indeed dealt with a mode of research in which relations between the physical and the psychical are established. Golgi’s studies on the nervous system, Helmholtz’s experiments on sense-perception, and Wundt as experimental psychologist proposing an integrative approach between mind and body: they all allow for physical and psychical interactions to emerge and therefore also for connection between disciplines, especially physiology with psychology.

Classical culture and the roots of the Tree of Knowledge

Classical culture was so important to Moleschott that, in the abovementioned Senate speeches, he complains about a lack of ‘style’ in the writings of students (in the Italian language and, even more, in Latin and ancient Greek) – something which may seem uncommon for a materialist to do. Above all, he complains about the fact that students (at high school, as well as at the university) do not study for the sake of science, but just because they are afraid of not passing the examinations. For Moleschott, if students are not educated according to what one would call a ‘classical’ model, they will never be mature enough for science (the military metaphor literally meaning that they will never be ‘general officers’ but just ‘soldiers’ or in the best case ‘corporals’).

It should be noted that technical faculties are also explicitly included in this setting of higher education at university level, with the Philosophical Faculty as their background, since only the contact with ‘pure science’ like philosophy fosters the progress of all disciplines, including the applied sciences. The study of classical culture, however, means neither dogmatism nor the absence of experimental method: on the contrary, more time should be dedicated to experimentation in the laboratories and there should be space for self-reflection and critical thinking:

Constantly worried about the nightmare of examinations, the student does not even keep a short half of an hour, during the lecture-period, for his favorite studies, or – which would be even better – to reflect by himself and take some research initiative. It is not just about the psychological harm the student has to undergo because he has to think the whole year long about the examinations he will have to go through at the end of the course. We oblige him to a sterile and servile study, with which, apart from few and rare exceptions, he makes nothing of his own [ideas]. He cannot find any time to go to the laboratories, he cannot find any time to learn how to do
research. And yet it is one’s own research, carried out under the direction of a good teacher, with a rigorous method, during the time of university studies, which will be valuable his whole life long.26

The Philosophical Faculty is not seen here as a domain of the humanities in opposition to the natural sciences, but rather as literally ‘embracing’ all the subjects and giving them a basis, including ‘moral sciences, history, literature in its broadest sense, philosophy, including also speculative philosophy, mathematics, all positive sciences, [and] all natural sciences.’27

The image of ‘classical’ culture as an all-encompassing theoretical framework for scientific development is constantly present in the speeches about higher education held in 1886-1887. For instance, Moleschott’s use of the tree metaphor continues to underline the function of the Philosophical Faculty as ‘roots’ for the other disciplines:

Now, I will briefly tell you my intention. If you have such a Philosophical Faculty joining all pure science one can find in higher education, then you will have what is usually called alma mater studiorum. In such a Faculty, all roots of knowledge would be accessible to everyone who seriously wanted to deepen their field of study. The one who found his first lymph there is prepared to choose to go in the direction of law or medicine, or to become an engineer; but all three of them will continuously have to think, again and again, of the root they found in that great Philosophical Faculty.28

If the roots of the tree representing the system of knowledge are contained in the Philosophical Faculty, we should ask what the fruits of this tree are. According to Moleschott, ‘ethical progress’ is ‘not less worthy than scientific progress’, it is in fact its ‘ripest fruit’:

Gentlemen of the Senate, I see many ‘complete men’ in Italy, who join deep knowledge with artistic feeling; scientific meditation has not destroyed the energy of action in them, and there is a discrete number of people who have not left apart the ‘cult of the ideal’ within their ‘positive studies’. Without this, there cannot be any high aspiration, nor guarantee of ethical progress, which is no less worthy than scientific progress, being in fact its ripest and most delicious fruit.29

During another discussion at the Senate a couple of weeks later (December 14, 1886), Moleschott expresses the idea that one should study natural science and do scientific research for the sake of it, because otherwise there cannot be any
progress; only if one does not aim at any direct application, do great discoveries occur. After having mentioned a few scientific discoveries such as the telegraph and electricity, which he presents not as products of goal-oriented specific research, but rather as results of profound, general, pure research, he arrives at the point of enumerating among the discoveries led by disinterested research even ‘the discovery of man’, which he attributes to Socrates as initiator, followed by Spinoza, and finally Renan. Without this discovery, mankind would have never achieved its ‘most ideal progresses’ and, again, it is the Philosophical Faculty, ‘richly nourished’ as Moleschott would like it to be, that is presented as the condition of possibility for such ‘deep studies’, for ‘the purest, most general, most profound of scientific studies’ leading to these important discoveries, such as that of the mechanical equivalent of heat.

On the basis provided by the Philosophical Faculty, Moleschott thinks that ‘the most complete, broadest, richest and widest University in the world’ could originate and grow, and would have as a result the establishment of a secure ground for science to develop in contact with the arts, for technical faculties to be in relation with ‘beauty’. What Aeschylus’s Prometheus calls the ‘pantechnic’ flame (‘παντέχνου πυρὸς σέλας’, a quote from line 7 of Aeschylus’s tragedy) is what would embrace the whole of science, knowing how to reach its source and how to spread it throughout the world.

Interestingly, the relationship of Moleschott’s materialism to metaphysics is an ambiguous one: metaphysics appears to be not completely excluded, but at the same time is refused as far as its nonempirical objects and methods are concerned, and maintained with respect to its ultimate scopes (as a unifying theory of both science and reality). One of Moleschott’s comments regarding his setting of materialist science within the framework of a ‘humanistic’ tradition, which can only be continued and guaranteed by the Philosophical Faculty, is particularly significant in the context of this discussion. Although some of his colleagues disagreed with how the Philosophical Faculty should be comprised of so many different disciplines, Moleschott presents this as an advantage, suggesting that it makes possible for each discipline to recognize their own limits. He goes on to write about a physicist and a metaphysician, where he argues that the physicist would ‘absorb’ a great part of metaphysics, and that this would likely lead to positive results for both sciences. It has to be noticed that Moleschott literally uses the verb ‘to absorb’, which both supports and confirms our interpretation of materialism as an ‘inclusive’ worldview. It is precisely this absorption and inclusiveness of scientific materialism vis-à-vis nonscientific domains that characterizes the relation between natural sciences and the humanities in late-nineteenth-century positivism.

Natural science thus stands in a reciprocal exchange with nonempirical subjects such as ethics and metaphysics. At the same time, as Moleschott himself
observed in the abovementioned speech at the University of Turin, during the second half of the nineteenth century an increasing number of disciplines, also in the field of the humanities, started to make claims as to their appropriation and utilization of empirical methods. Moleschott’s conception of the system of science appears to be an attempt to connect disciplines and domains in a broader, more comprehensive system, where the relation between materialism and the humanities appears to be open rather than demarcating. The fact that Moleschott aimed at securing an educational structure – which would constitute concretely what he called ‘the unity of science’, a unity that would be represented by a ‘Philosophical Faculty’ founded on classical (ancient) culture and philosophy – suggests that materialism was not the rigid, reductionist system that it is often thought to be. Instead, it significantly contributed to assign the humanities a crucial role in the context of Italian higher education.

**Notes**

1 I would like to thank Dr. Robert Ryder for correcting my English and giving me inspiring feedback on this paper.


4 Jacob Moleschott, *Della causalità nella biologia. Sesta prolusione al corso di fisiologia sperimentale alla Regia Università di Torino letta dal Professore Jac. Moleschott il dì 8 gennaio 1867* (Turin: Loescher, 1867), 9. All translations in this article are mine.

5 *Ibid.*: ‘Ora se i poeti ed i naturalisti si sono data la mano nel comprendere ed accettare quella legge della necessità, che è base e condizione assoluta di ogni sapere, non è di certo meraviglioso il vedere come eziandio i cultori delle discipline così dette morali, della linguistica, della storia, delle scienze sociali s’incontrino cogli scienziati nell’applicazione di quel metodo che il naturale, vale a dire il necessario, sviluppo di ogni cosa impreetribilmente ne prescrive’. One should remark that ‘naturalists’ and ‘poets’ are much older words than the division between *Natur*- and *Geisteswissenschaften*, and that they are not identical with these domains: in fact, it seems that this division was not so clear and accomplished yet, although progressive specialization required the theorization of a ‘common ground’, a unified system of the sciences.

6 *Idem*, 3.


8 *Idem*, 10.

9 Jacob Moleschott, *Carlo Roberto Darwin. Commemorazione pronunciata a nome degli studenti dell’Università di Roma nel giorno 25 giugno 1882* (Turin: Loescher, 1882) and *idem*,

E.g., Ernst Haeckel (1834-1919) and Herbert Spencer (1820-1903).

In this regard, compare Moleschott, Carlo Roberto Darwin.

Moleschott, Della causalità nella biologia, 3.

10 Idem, 11-12: ‘Essa è precisamente la filosofia che compenetrandosi dell’unità della legge di necessità, indotta dai fatti, siano naturali siano storici, ha da sublimarli in quell’organismo universale il quale sarà l’espressione adeguata e quindi bella dell’unità della scienza. Tale filosofia dimostrerà le condizioni naturali degli avvenimenti storici, le condizioni storiche dei fenomeni naturali, e ciò coll’aiuto di un unico metodo che sarà mai sempre lo sperimentale ed induttivo’ (my emphasis). Here, it has to be noticed that demonstrating the ‘historical conditions of natural phenomena’ means embedding the study of nature in its cultural background; at the same time, it constitutes a clear example of the transfer of concepts deriving from Darwinism to the theory of knowledge. As can be inferred from the reference to ‘the experimental and inductive method’, the evolutionary conception of natural history is transferred to history as such.

14 The ‘Philosophical Faculty’, as it is presented in Moleschott’s Senate speeches, does not actually refer to any particular philosophical stream or approach to philosophy: it simply provides a cultural background in the humanities and classical culture. For more details on its function, see below.

15 Archives de l’État de Neuchâtel, Fonds Edouard Desor, Carton 13, D55 (Moleschott to Desor, Zürich 21/09/1859 and 21/05/1860).


18 Compare Paul Ziche, Wissenschaftslandschaften um 1900: Philosophie, die Wissenschaften und der nichtreduktive Scientismus (Zürich: Chronos, 2008), 178ff.

19 Moleschott, Sulla scelta dei professori, 6-7.


21 Moleschott, Sulla scelta dei professori, 7.

22 Idem, 16.

23 Moleschott, Discorsi, 14-17 (29/11/1886).


25 Idem, 17.

26 Idem, 18-19.

27 Idem, 19. In the original, the Italian word ‘succhi’ (meaning ‘juice’, but also ‘lymph’, especially in nineteenth-century Italian) should be understood as a continuation of the tree metaphor.
Among the members of the Senate, the critics of the Philosophical Faculty were the Minister of Public Education Michele Coppino (1822-1901) and the historian Pasquale Villari (1827-1917).

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'Idem, 32-33.'

'Idem, 35-36 (14/12/1886).'

'Idem, 38.'

'Idem, 44.'

'Ibid.'

'Ibid.'

'Ibid.'

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A seconda della forza dei due ['il fisico ed il metafisico', L.M.], gioverà al fisico di vedere dove cominci la metafisica, o al metafisico di vedere dove il suo campo finisce. E potrà anche succedere, come è successo, che il fisico assorba larga parte della metafisica, e potrà fare un bene a tutte e due le scienze' (my emphasis).